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31 March 1953

SECURITY INFORMATION

MEMORANDUM FOR: THE RECORD

SUBJECT: Field Tests

1. From December 12 through 15, inclusive, the first of a series of field tests were run on the Radio Switch (VHF)  The following personnel participated in the tests:

2. The aim of these tests was to investigate the maximum range of the Radio Switch (VHF) under a variety of circumstances and conditions; to investigate and examine the reliability of the system under various conditions, and to examine and evaluate operational techniques in the use of the system.

3. It was planned to test the switch under the following variable conditions:

- a. Altitude
- b. Attitude
- c. Range
- d. Atmosphere
- e. Terrain
- f. Transmitter Power
- g. Complexity of System
- h. Positioning of Switch

4. In accordance with the requirements set forth in the above paragraph, five (5) receivers were setup in the following environments:

- (1) Receiver and battery were buried in an open field with 1/4 of the antenna above ground.
- (2) Receiver and battery were placed in an open field some 50 feet from a wooded area; cleared area out to a minimum of one mile on other three sides.
- (3) Receiver and battery located on ground within a wooded area (tall pines and scrub brush) a minimum of 200 feet from cleared area.
- (4) Receiver and battery lashed to a tree at the edge of a wooded area some 20 feet above ground.
- (5) Receiver and battery covered with scrub brush and pine needles at edge of wooded area.

All receiver antennas

JOB NO.  BOX NO.  FILE NO.  DOC NO.  NO CHANGE  
 IN CLASS/ RECLASS/ CLASS CHANGED TO: TS  RET. JUST.   
 NEXT REV DATE  89 REV DATE  6/12/77  
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 REV CLASS  C REV COORD.  AUTH: HR 70-3

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5. All receiver antennas were vertically polarized. Switch relay leads were connected to an indicator board which effectively placed a lamp (with external power source) in series with each switch, whereby a closed relay would be indicated by a glowing lamp. The various symbols used on the tabulated sheets maybe interpreted as follows:

- X - Relay held steady on correct signal.
- (X) - Relay held intermittently on correct signal.
- - Relay closed on incorrect signal.
- O - No Response.

6. Table #1 shows the results of a series of tests conducted on the ground. For these tests a transmitting antenna was tied to the windshield post of a [ ] jeep and connected to the 1/4 watt transmitter with coaxial cable. The antenna base was on the same level as the canvas top on the jeep.

7. It is felt that the tabulated results of the ground tests are self-explanatory. The following comments, however, appear to be pertinent. This series of tests were the first to be run on the equipment and thus it was expected that certain faults would be uncovered. The most serious of them seem to be the series of relay closures on a signal with the wrong tone. Recent conferences with the contractor, however, covered this problem and as a result certain changes have since been made in the final audio output stage of each of the coded receiver units which should eliminate faulting. Future tests will determine the adequacy of these changes. In addition to the internal changes already made on the switch it is felt that major changes are in order for the external cabling and connectors with an eye toward making them waterproof and positive locking. The contractor has accordingly been asked to submit a proposal for a new task to thoroughly investigate the field of cabling and connectors.

8. While there were no failures during these tests due to battery or power supply defects it is felt that the present power supply is somewhat inadequate with regard to temperature characteristics and life. It is hoped that further study may improve the characteristics to a more reliable level.

9. For the air to ground tests a transmitting antenna (vertically polarized) was lashed to an external frame member of the Air Force L-20 airplane utilized in the test. A coaxial cable connected the antenna to the 1/4 watt transmitter carried inside the plane. Distances from ground zero were plotted on a standard C.A.A. chart of the area and altitude was read off the plane's altimeter. The same general comments made with regard to the ground tests are applicable here. In addition the importance of raising the receiver antenna above the ground for its affect on receiver reliability should be stressed. In our tests we found that raising the receiver antenna as little as 20 feet above ground almost doubled the range at which reliable switch closure could be expected.

10. While the present tests

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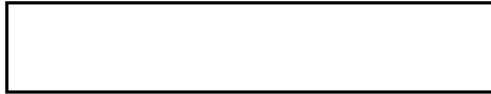
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10. While the present tests were not in any sense exhaustive, and in fact were the first of a longer series, it is felt that they did demonstrate the basic operational qualities of the subject equipment and with the exception of the faulting of the coded receivers (since corrected) proved to be a basically sound system. Additional tests are now being arranged.

11. The undersigned would like to express his appreciation for the fine cooperation given the TSS/APD test party [redacted] by members of the TR/S group.

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